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Abstract

AN EXPERIMENTAL STUDY OF Sr^{90} CONTAINED IN MARINE ANIMALS FOLLOWING POSSIBLE RELEASE OF RADIOACTIVE WASTE IN SEA WATER

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Nerita forskalii Recluz: a gastroped belonging to the family Neritides is found in great abundance along the shore of the Red Sea as well as the Gulfs of Suez and Aqcaba. It is of ubiquitous occurrence throughout the region of the Indian ocean and the warmer parts of other oceans. It contains comparatively high concentration of Sr, and could be kept in glass aquaria indoors. For these reasons the gastroped was used for the investigations.

The study comprised the following:

1 - The ionic content in the animal shells determined flame-photometrically were found 33.1 ± 0.4 (26), 183 ± 5.8 (27), 15.6 ± 0.4 (25) and 673 ± 8.3 (27) as mg/100 g dry shell ± s;d. (No. of experiments) for Ca^{++}, Sr^{++}, K^{+} and Na^{+} respectively. The corresponding values in the soft tissues were 750 ± 10 (9), nil, 461 ± 39 (9) and 1438 ± 285 (9).

2 - The average values for Sr in shells as mg/100 g dry shell of animals weighing less than 2 g and more than 2 g were found 222 ± 8.4 (7) and 169.5 ± 4.2 (20) respectively, i.e. young animals contain more Sr in their shells than older ones.

3 - The ionic content in the animals was statistically the same for those collected from Al-Ghardagua and Suez.

4 - The ionic content in sea water as mg/litre was 588, 72, 643 and 13.1 x 1000 for Ca, Sr, K and Na respectively.

5 - The Sr^{90} content in 100 g dry animal shell was found 3357 ± 107 (12) in terms of u.u.c. or 101.4 ± 3.3 (12) in terms of Sr units, and in one litre sea water 5.4 ± 0.1 (6) u.u.c., and 9.0 ± 0.2 (6) Sr units.

6 - The $T_{\frac{1}{2}}$ for the uptake of Sr^{90} by the animal shells from sea water containing 90 u.c./litre during a period of one month increased progressively from 1.4 to 37.5 days. The fraction exchange of Sr in the shells increased for the same period from 0.0036 to 0.0741.

7 - The $T_{\frac{1}{2}}$ for the uptake of Sr^{90} by the animal soft tissues from sea water containing 40 u.c./litre during a period of one month increased progressively from 3.4 to 15.0 days. When the external activity was raised to 90 and 190 u.c./litre the $T_{\frac{1}{2}}$ during the period 16-28 days of uptake were found 16.3 and 18.0 days respectively.

8 - The ratios $\frac{Sr^{90}/\text{litre sea water}}{Sr^{90}/100\ g \text{ dry shell or soft tissues}}$ = RW/SL or RW/ST were determined. These could be considered as valuable indices for the calculations of Sr^{90} content in sea water by determining the Sr^{90} content in either the shell or the soft tissue for a given period of uptake.

9 - The $T_{\frac{1}{2}}$ for the release process of Sr^{90} from the soft tissues was found to be 1.25 days for the first day and 30 days for the following 6 days. Sr^{90} was not detectably released from the shells.

10- The kinetics and the nature of the processes involved in the uptake and release of Sr for the gastroped in the light of the results obtained are discussed.

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